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An overview and a contribution to the optical measurement of linear displacement

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Abstract:

The present work is a contribution to the field of linear displacement measurements by optical means. For that purpose, a brief overview of some existing solutions is presented and two systems for axial linear displacement measurement based on light intensity detection are introduced. The systems have redundancy and were designed with the purpose of achieving identification and automatic correction of errors arising from inadvertent angular variations between the sensor and the light beam positions.

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I. Introduction: An Overview of Optical Linear Displacement Measuring Systems

The measurement of linear displacement is a very important topic encompassing a large number of solutions. Due to its ruggedness and often contactless characteristics, optical systems are one of the most adopted, particularly when fast changes in displacement need to be measured. Moreover, due to the physical principles that support the operation of some of those systems (e.g., optical interferometry), they allow the measurement of linear displacements with resolutions and accuracies below the nanometer. A brief overview of the measurement of linear displacement by optical or electro-optical means is presented in the following sections.

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